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Case Report

Fibrinolysis in the management of malignant ascites and nonfunctioning intraperitoneal tunneled catheters

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A B S T R A C T

The use of tunneled semipermanent intraperitoneal catheters is becoming increasingly widespread in the management of intractable malignant ascites. There is a lack of published data on the successful management of complications of these catheters in cases of malignant ascites. The current study reports four cases of nonfunctioning catheters due to fibrin blockage or ascitic loculation, all of which were successfully treated with intraperitoneal fibrinolysis with streptokinase.

Keywords: complications, indwelling catheter, malignant ascites, paracentesis

Introduction

Malignant ascites is a common condition in patients exhibiting an intraperitoneal tumor spread. It is a frequent cause of morbidity, causing intractable nausea, anorexia, dyspnea, and painful abdominal distension, all of which markedly reduce a patient's quality of life. Traditionally this has required repeated inpatient admissions with temporary intraperitoneal catheter placement.

Tunneled semipermanent intraperitoneal catheters have now gained acceptance as the primary method for long-term paracentesis, allowing out of hospital management. Literature reviews have demonstrated it to be a safe and effective technique with a similar or lower complication profile to standard large volume nontunneled paracentesis. Tunneled catheter malfunction due to fibrin formation, ascitic loculation, and peritonitis appear uncommon in the setting of malignant ascites.[1] In a large, single-center study, 170 patients had tunneled intraperitoneal catheter placement for malignant ascites. The dwell time ranged between 0 and 796 days (mean 60 days) with five occlusions/tube malfunctions.[2]

Tube malfunction is a well-recognized complication in similarly designed long-term tunneled catheters inserted for continuous ambulatory peritoneal dialysis (CAPD), eventually occurring in up to 65% of cases, and has recognized management strategies.[3] No standardized protocol exists for the management of catheter malfunction in respect to malignant ascites and long-term tunneled catheters. This study reports the experience of four cases of catheter blockage and ascitic loculation, successfully treated with intraperitoneal streptokinase administered via 15.5F tunneled intraperitoneal PleurX (UK Medical Ltd, Sheffield, UK) catheters, and suggests a management strategy for malfunctioning catheters.

Case reports

Case 1

A 34-year-old male with Stage IV gastric adenocarcinoma and recurrent malignant ascites presented with a nonfunctioning tunneled catheter 9 weeks post insertion. Initial ultrasound showed a large volume densely loculated ascites (Fig. 1A). A tubogram showed a patent catheter lumen with reduced dispersal beyond the side holes in keeping with the ascitic loculation. In an attempt to salvage the catheter without requiring removal, fibrinolysis with 250,000 IU of streptokinase was delivered once daily for a total of 5 days via the tunneled catheter. Follow-up ultrasound on Day 2 showed a reduction in ascites with a functioning catheter permitting drainage of ascites. Sequential daily ultrasounds demonstrated almost complete resolution of the loculated ascites by Day 5 (Fig. 1B). No adverse events were reported following intraperitoneal fibrinolysis and the patient had successful palliation of ascites at home until death 3 weeks later.

Case 2

A 59-year-old male with Stage IV renal cell carcinoma presented with a nonfunctioning catheter 10 weeks post insertion. Ultrasound showed a large volume of loculated ascites, and a tubogram

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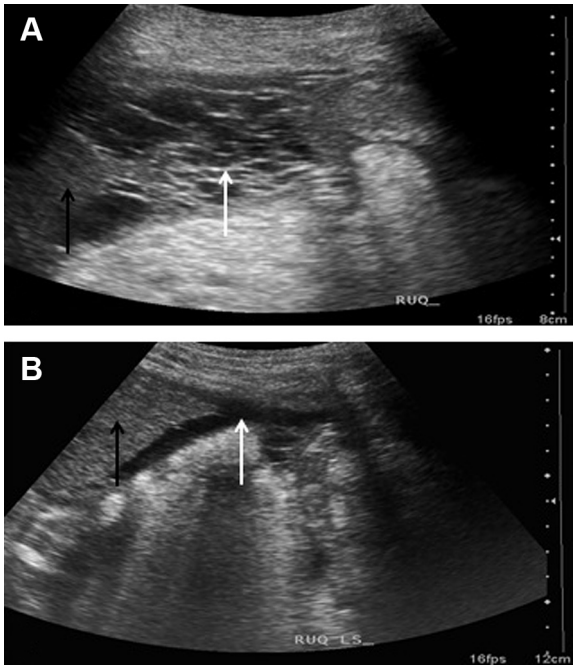

Fig. 1. (A) Longitudinal ultrasound scan through the right upper quadrant demonstrating dense loculated ascites with a honeycomb appearance (white arrow) and inferior liver (black arrow). (B) Longitudinal scan of the right upper quadrant on Day 5 on fibrinolysis showing liver (black arrow) and minimal residual ascites (white arrow).

demonstrated a reduced luminal caliber with poor dispersal of contrast beyond the fenestrated side holes suggesting catheter occlusion (Fig. 2A). An attempt to recanalize the catheter with a stiff 0.035 inch guide wire was unsuccessful, and it was felt that intraperitoneal fibrinolysis might not be deliverable through the occluded catheter lumen. This prompted catheter removal, confirming a fibrin plug causing the occlusion (Fig. 2B). A new tunneled catheter was inserted allowing fibrinolysis to be delivered once daily for 5 days. Follow-up ultrasound studies showed decreasing loculation with successive daily fibrinolysis. A tubogram on Day 5 showed free dispersal of contrast between bowel loops in the pelvis. The catheter had spontaneously repositioned in the lower abdomen (Fig. 2C) suggesting dissolution of the loculation. Free drainage of ascites to resolution, was confirmed with same-day ultrasound. The patient had uneventful and successful drainage of ascites at home, until death 7 weeks later.

Case 3

A 55-year-old female with Stage IV breast carcinoma presented with a nonfunctioning tunneled catheter 11 weeks post insertion. An ultrasound study demonstrated densely loculated ascites throughout the abdomen and pelvis (Fig. 3A). A same-day computed tomography (CT) scan underestimated the extent of ascitic loculation but showed no evidence of catheter kink, migration, or misplacement. A subsequent tubogram demonstrated an obvious catheter lumen with poor dispersal around the catheter tip, again in keeping with ascitic loculation. As the lumen was evident on the tubogram study, the catheter was not removed on this occasion and fibrinolysis was delivered once daily for 5 days. An ultrasound performed on Day 2 of fibrinolytic therapy showed markedly reduced loculation with a clinically functioning catheter (Fig. 3B). Ultrasound examination on Day 5 of therapy demonstrated further radiological improvement with complete resolution

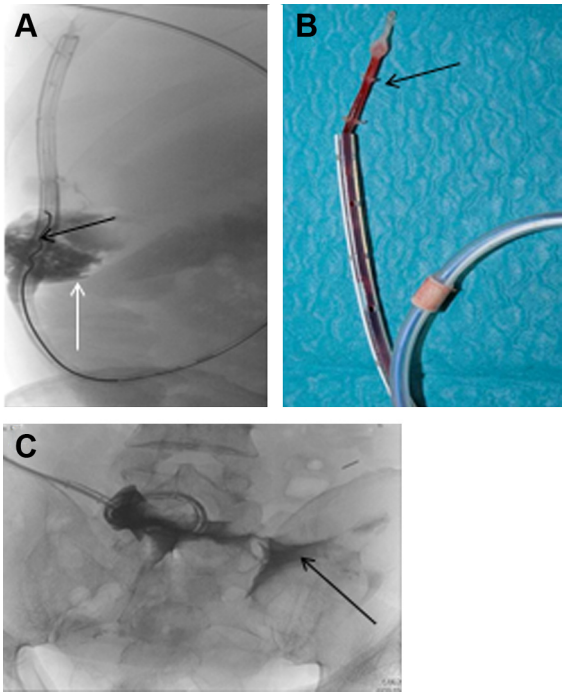

Fig. 2. (A) Tubogram showing an occluded distal lumen. A stiff 0.035 inch guidewire has buckled within a fibrin plug during attempted recanalisation (black arrow). Poor dispersal of contrast beyond the catheter side holes (white arrow) is in keeping with loculation. (B) Removal of the PleurX catheter shows a fibrin plug occluding the lumen (black arrow). (C) Post fibrinolysis tubogram shows a mobile catheter with free dispersal of contrast amongst bowel loops (black arrow) in keeping with the dissolution of loculation.

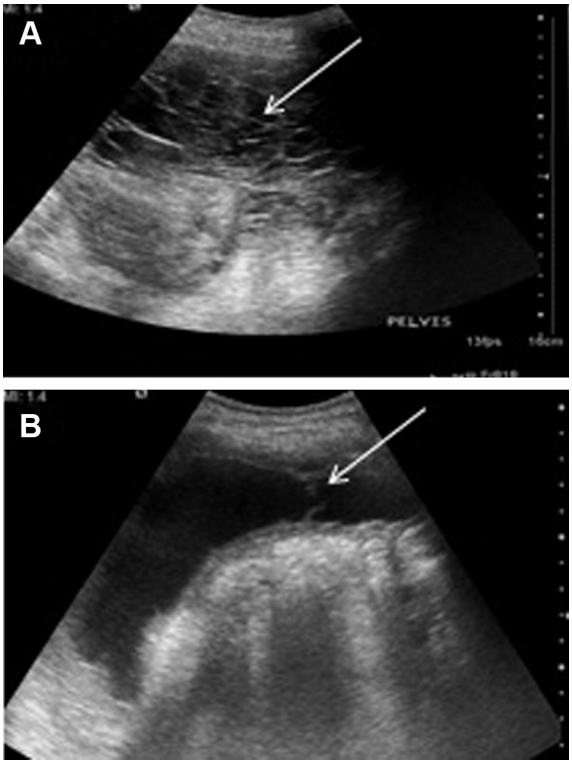

Fig. 3. (A) Transverse ultrasound image of the pelvis showing a honeycomb appearance (white arrow) indicating densely loculated ascites. (B) Transverse ultrasound image of the pelvis on the second day of fibrinolysis showing markedly reduced loculation with some residual fibrin stranding in the midline (white arrow).

of ascites and loculation. The patient achieved successful drainage of ascites at home until death 13 months later.

Case 4

A 68-year-old female with a Stage IV neuroendocrine carcinoma, peritoneal metastasis, and recurrent malignant ascites presented with a nonfunctioning tunneled catheter 24 weeks following placement. Initial ultrasound showed a large volume of non-loculated ascites (Fig 4A). It proved impossible to aspirate the ascites and attempts to flush the tube were also unsuccessful. CT was performed to exclude tube migration into a dry area of the peritoneum and demonstrated a well-placed tube lying in the body of ascites (Fig. 4B) A tubogram demonstrated poor dispersal of contrast beyond the catheter side holes, and attempted 0.0035 inch guide-wire recanalization of the catheter was not possible, further suggesting fibrin plug occlusion (Fig. 4C). The catheter was left *in situ* on this occasion, and fibrinolysis was delivered into the indwelling catheter, resulting in free drainage and ascetic resolution by Day 3 of treatment. The patient achieved successful drainage of ascites at home until death 38 weeks post fibrinolysis.

Discussion

These cases report the successful use of intraperitoneal fibrinolytics in the treatment of occluded tunneled catheters and loculated malignant ascites. No standardized protocols exist for the investigation or management of nonfunctioning tunneled catheters in this setting. While there are no large scale studies to accurately describe the safety profile of fibrinolytic drugs in the treatment of complicated malignant ascites, intraperitoneal fibrinolysis is, however, a recognized therapy in cases of fibrinous occlusion, fluid loculation, and peritonitis in CAPD catheter dysfunction.[2,4] In addition, it is a recommended therapy for symptomatic, loculated malignant pleural effusions, and empyema.[4] There is no evidence of any increased relative risk of allergic reaction, or local/systemic hemorrhagic complication with the use of intraperitoneal fibrinolysis in CAPD catheter malfunction, or with intrapleural administration, even when the pleural effusion is hemorrhagic in origin.[5–8]

The lack of literature regarding the management of similar complications in tunneled catheters with malignant ascites may be a reflection of reduced long-term *in situ* catheter exposure in oncology patients with ascites who have a mean life expectancy of 1–4 months.[9] However, as the use of tunneled intraperitoneal catheters increases, it is expected that they will become an earlier intervention in the management of ascites. Thus, long-term complications may become more prevalent. Of note, the patients described presented with complications at 9, 10, 11, and 24 weeks following tunneled catheter insertion, which is at or beyond the upper limit of expected mean survival following development of ascites.[9]

As no large scale studies currently exist, the use of intraperitoneal fibrinolytics should be assessed on a risk verses benefit scenario for each individual patient. Investigation should consider combined multimodality imaging prior to any potential fibrinolytic therapy to exclude a nonfibrinous occlusion. If ultrasound confirms the presence of complicated ascites and loculation, CT can exclude catheter kink, misplacement, or migration into the lesser sac or omental layers, which might not be detectable by fluoroscopy or ultrasound alone. Of note however, CT underestimates the true extent of loculation (the ascitic fluid appearing uncomplicated on CT in all of the above described cases). A tubogram can then be performed to assess lumen patency, and determine whether thrombolytic agents can be delivered via the indwelling catheter. If the lumen appears completely blocked, new intraperitoneal access can be considered, but a bolus of fibrinolytic therapy into the catheter lumen may prove successful.

Based on previous publications detailing the fibrinolytic management of malignant loculated pleural effusions and CAPD related peritonitis,[2,4,5,8] a dose of 250,000 IU of streptokinase was dissolved in 50 mL 0.9% saline and administered via the tunneled catheter which was then clamped, ascitic drainage was subsequently performed 24 hours following administration. Fibrinolysis was repeated daily until there was radiological and clinical evidence of locule resolution and/or a normally functioning catheter, which occurred between 3 and 5 days in the described cases.

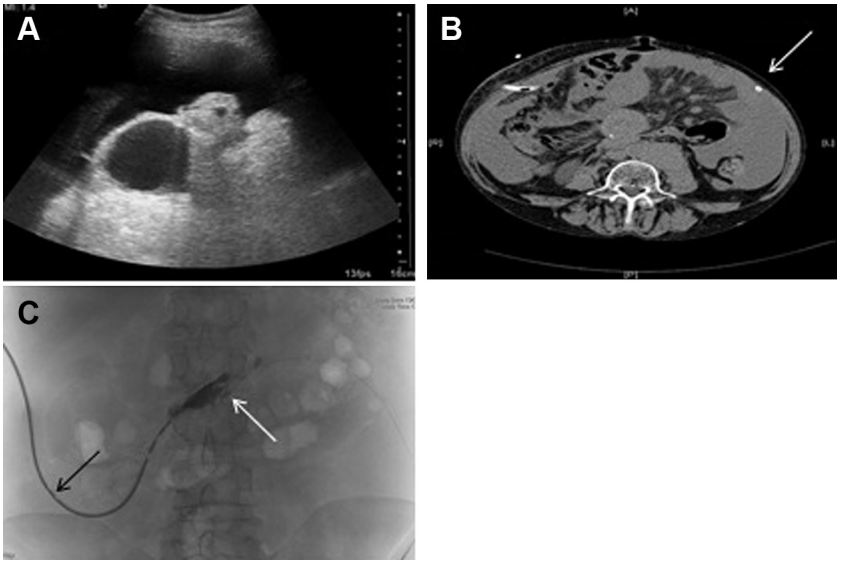

Fig. 4. (A) Longitudinal ultrasound scan of the upper abdomen showing uncomplicated ascites overlying bowel loops. (B) Computed tomography scan confirming that the distal catheter (white arrow) lies within the sump of the fluid and not between the omentum. (C) Tubogram showing limited dispersal of contrast beyond the side holes (white arrow) with a guide-wire inserted into the catheter (black arrow) unable to advance suggesting lumen occlusion.

In conclusion, this study reports four cases of nonfunctioning PleurX intraperitoneal catheters due to loculation and/or fibrin occlusion, which provoked slightly different management strategies. In all cases, streptokinase administered via the indwelling catheters achieved long-term secondary patency without complication. No hemorrhagic sequelae were encountered despite peritoneal dissemination of the tumor. It is a cost-effective and simple therapy which suggests that it should be considered in any cases of suspected fibrin blockage or loculated ascites with respect to malignant ascites and tunneled catheters.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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